

Effects of Temperatures on Symptom Expression by Sugarcane Infected with Different Strains of Mosaic Virus

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INTRODUCTION

Mosaic probably is the most important sugarcane disease in Puerto Rico. This disease was responsible for severe losses to the sugar industry between 1921 and 1927 when the noble cane varieties Cristalina, B.H. 10 (12) and S.C. 12/4 were cultivated extensively. Variation in the type of reaction of various canes to strains A and D have been observed frequently in the greenhouse during summer months. It appeared that these changes in symptomatology might have been induced by high temperatures. It has been shown that temperature often modifies symptoms elicited by certain plant viruses. According to Best (2),² tobacco mosaic virus incites formation of small, discrete necrotic lesions on *Nicotiana glutinosa* at low temperature (10° C.). At 35° C. or above there was no necrosis. Instead, chlorotic blotches were formed and the virus became systemic. In Puerto Rico, Bird, Tió, and Sánchez (3) observed great variation in the type and severity of symptoms incited by two strains of the cucumber mosaic virus on the plant species *Musa sapientum* L., *M. paradisiaca* L., *Commelina longicaulis* Jacq., and *Cucumis sativus* L. kept at different temperatures (65°, 75°, 85°, and 95° F.) in climate chambers.

Although Summers (5) pioneered in the identification of strains of the mosaic virus in Louisiana, and Bruehl (4) identified the three mosaic strains A, B, and D in Puerto Rico using differential hosts C.P. 31-294, C.P. 29-291, Co. 281, and Louisiana Purple, neither specifically studied the effect of different temperatures on symptom expression by sugarcane infected with different strains of the mosaic virus. The present studies were undertaken in an effort to obtain such data. It was thought results of such studies might be valuable in differentiating the several strains of the virus.

PROCEDURE AND RESULTS

Plants of the sugarcane variety C.P. 31-294 were planted in flats at the rate of 40 per flat and inoculated with mosaic virus strain A and B separately. The inoculated flats were kept in the greenhouse until typical mosaic

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² Italic numbers in parentheses refer to Literature Cited, p. 131-2.



FIG. 1.—Effect of temperatures (from left to right 95°, 85°, 75°, and 65° F.) on symptom expression of sugarcane variety C.P. 31-294 affected by mosaic virus strain B.



FIG. 2.—Effect of temperature (75° F.) on growth of sugarcane variety C.P. 31-294 affected by mosaic virus strains A and B.

symptoms developed. They were subsequently divided into 4 groups according to temperature treatments (65°, 75°, 85°, and 95° F.) and moved to the respective temperature chambers (each group consisting of 2 flats, one inoculated with mosaic virus strain A and the other with strain B). At 14-day intervals the symptom pattern on all plants was observed and data recorded. The results indicated that canes affected by mosaic virus strain A and kept at 85° F. were evidently more chlorotic than those kept either at 65° or at 75° F. Similarly, canes affected by mosaic virus strain B and kept at 85° F. showed more necrosis than those kept either at 65° or



FIG. 3.—Effect of temperature (95° F.) on growth of sugarcane variety C.P. 31-294 affected by mosaic virus strains A and B.

at 75° F. None of the canes developed necrosis when kept at the highest temperature (95° F.) (fig. 1).

At 75° F., canes affected by mosaic virus strain B were more stunted than those affected by strain A (fig. 2). However, at the highest temperature (95° F.), canes affected by both strain A and B grew equally well (fig. 3).

DISCUSSION

Presence or absence of necrosis on a selected differential host has been an important diagnostic character for differentiating strains A, F, and H from strains B, C, and D. Similarly, growth retardation was used by Summers,

Brandes, and Rands (6) in 1948 as the principal character to differentiate strain D from E and strain B from G.

After studying the effect of temperature on symptom expression and stability of strain D, Abbott (1) reported that temperature had no apparent effect on symptom expression or strain stability. The results of our studies clearly indicate there is a definite influence of temperature on symptom expression by sugar-canes affected by mosaic virus strains A and B. Necrosis incited by mosaic virus strain A at 65°, 75°, and 85° F. did not occur at the highest temperature 95° F. Similarly, growth retardation resulting from infection by strain B at low temperatures (65° and 75° F.) did not occur when the plants were kept at the highest temperature (95° F.).

SUMMARY

A study was made to determine the effect of various temperatures (65°, 75°, 85°, and 95° F.) on symptom expression by sugarcane plants affected by mosaic virus strains A and B in climate chambers. Symptoms incited by both strains A and B on sugarcane differential host C.P. 31-294 were best observed at 85° F. Necrosis produced by strain A at 65°, 75°, and 85° F. did not occur at 95° F. Growth retardation resulting from infection by strain B at 65° and 75° F. was not observed at 95° F.

RESUMEN

Se hizo un estudio para determinar el efecto de varias temperaturas (65°, 75°, 85°, y 95° F.) en la expresión sintomática de plantas de caña de azúcar afectadas por las cepas A y B del virus del mosaico de la caña, cultivadas en cámaras climáticas. Los síntomas incitados por ambas cepas, A y B en el huésped diferencial C.P. 31-294 se manifestaron mejor a una temperatura de 85° F. La necrosis producida por la cepa A a temperaturas de 65°, 75° y 85° F. no ocurrió a los 95° F. La condición de crecimiento retardado, como resultado de la infección de la cepa B a los 65° y 75° F., no se observó a los 95° F.

LITERATURE CITED

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